

Translation

PATENT COOPERATION TREATY

PCT

INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY (Chapter II of the Patent Cooperation Treaty)

(PCT Article 36 and Rule 70)

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| Applicant's or agent's file reference BNANO005CWO | FOR FURTHER ACTION | | See Form PCT/IPEA/416 |
| International application No. PCT/BE2004/000113 | International filing date (day/month/year) 05.08.2004 | Priority date (day/month/year) 05.08.2003 | |
| International Patent Classification (IPC) or national classification and IPC C01B31/02, C08K7/24, C08F2/44, B01J21/18 | | | |
| Applicant S.A. NANOCYL | | | |
| <p>1. This report is the international preliminary examination report, established by this International Preliminary Examining Authority under Article 35 and transmitted to the applicant according to Article 36.</p> <p>2. This REPORT consists of a total of _____ sheets, including this cover sheet.</p> <p>3. This report is also accompanied by ANNEXES, comprising:</p> <p>a. <input checked="" type="checkbox"/> (<i>sent to the applicant and to the International Bureau</i>) a total of 7 sheets, as follows:</p> <p><input checked="" type="checkbox"/> sheets of the description, claims and/or drawings which have been amended and are the basis for this report and/or sheets containing rectifications authorized by this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions).</p> <p><input type="checkbox"/> sheets which supersede earlier sheets, but which this Authority considers contain an amendment that goes beyond the disclosure in the international application as filed, as indicated in item 4 of Box No. I and the Supplemental Box.</p> <p>b. <input type="checkbox"/> (<i>sent to the International Bureau only</i>) a total of (indicate type and number of electronic carrier(s)) _____, containing a sequence listing and/or tables related thereto, in computer readable form only, as indicated in the Supplemental Box Relating to Sequence Listing (see Section 802 of the Administrative Instructions).</p> <p>4. This report contains indications relating to the following items:</p> <ul style="list-style-type: none"> <input checked="" type="checkbox"/> Box No. I Basis of the report <input type="checkbox"/> Box No. II Priority <input type="checkbox"/> Box No. III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability <input type="checkbox"/> Box No. IV Lack of unity of invention <input checked="" type="checkbox"/> Box No. V Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement <input type="checkbox"/> Box No. VI Certain documents cited <input type="checkbox"/> Box No. VII Certain defects in the international application <input type="checkbox"/> Box No. VIII Certain observations on the international application | | | |

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|---|-----------------------------------|
| Date of submission of the demand | Date of completion of this report |
| Name and mailing address of the IPEA/EP | Authorized officer |
| Facsimile No. | Telephone No. |

INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY

International application No.
PCT/BE2004/000113

Box No. I Basis of the report

1. With regard to the language, this report is based on the international application in the language in which it was filed, unless otherwise indicated under this item.

This report is based on translations from the original language into the following language _____ which is the language of a translation furnished for the purposes of:

- international search (Rule 12.3 and 23.1(b))
- publication of the international application (Rule 12.4)
- international preliminary examination (Rule 55.2 and/or 55.3)

2. With regard to the elements of the international application, this report is based on (*replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report*):

the international application as originally filed/furnished
 the description:

pages 1-47 as originally filed/furnished

pages* _____ received by this Authority on _____

pages* _____ received by this Authority on _____

the claims:

nos. _____ as originally filed/furnished

nos.* _____ as amended (together with any statement) under Article 19
06.06.2005 with letter
 nos.* 1-34 received by this Authority on of 01.06.2005

nos.* _____ received by this Authority on _____

the drawings:

sheets 1/14-14/14 as originally filed/furnished

sheets* _____ received by this Authority on _____

sheets* _____ received by this Authority on _____

a sequence listing and/or any related table(s) – see Supplemental Box Relating to Sequence Listing.

3. The amendments have resulted in the cancellation of:

the description, pages _____
 the claims, nos. _____
 the drawings, sheets/figs _____
 the sequence listing (*specify*): _____
 any table(s) related to sequence listing (*specify*): _____

4. This report has been established as if (some of) the amendments annexed to this report and listed below had not been made, since they have been considered to go beyond the disclosure as filed, as indicated in the Supplemental Box (Rule 70.2(c)).

the description, pages _____
 the claims, nos. _____
 the drawings, sheets/figs _____
 the sequence listing (*specify*): _____
 any table(s) related to sequence listing (*specify*): _____

* If item 4 applies, some or all of those sheets may be marked "superseded."

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| International application No. PCT/BE2004/000113 |
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| Box No. V | Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement |
|-----------|---|

1. Statement

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|-------------------------------|--------------------|-----|
| Novelty (N) | Claims <u>1-34</u> | YES |
| | Claims _____ | NO |
| Inventive step (IS) | Claims <u>1-34</u> | YES |
| | Claims _____ | NO |
| Industrial applicability (IA) | Claims <u>1-34</u> | YES |
| | Claims _____ | NO |

2. Citations and explanations (Rule 70.7)

Cited documents:

D1 : ALEXANDRE, MICHAEL ET AL: "Use of metallocenes in the polymerization-filling technique with production of polyolefin-based composites" MACROMOLECULAR RAPID COMMUNICATIONS (2000), 21 (13), 931-936, 2000,
XP002282544

D2: US 2003/119920 A1

D3: PATENT ABSTRACTS OF JAPAN vol. 2000, no. 06, 22 September 2000 (2000-09-22) & JP 2000 086217 A

D4: WO 02/076888 A

The subject matter of claims 1-34 appears to meet the requirements of novelty and inventive step.

Document D1 is considered the closest prior art. Said document describes a method for the deposition of metallocenes as catalysts and of methylalumininoxane as a co-catalyst on polymer filler materials. The modified fillers are capable of dispersing far more easily, and a higher level of filling can be obtained.

The method described in D1 differs from the subject matter of claims 1-23 in that D1 describes a plurality of different substances to be used as possible fillers, such as kaolin and graphite, but not carbon nanotubes. The

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Box No. V **Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement**

substances used as fillers in D1 have different physical properties from those of carbon nanotubes.

The composite materials obtained according to claims 1 - 23 have improved mechanical properties, thermal stability and fire behaviour. These technical effects for carbon nanotubes are not foreseeable in the light of D1.

Document D2 describes carbon nanotubes formed on a large-pore support. A catalyst composition is deposited on the carbon nanotubes. No co-catalyst is disclosed. This catalyst system can be used in different types of chemical reactions such as polymerisation. The technical effects obtained with the method according to the present application are not foreseeable in the light of D2.

Document D3 describes a catalyst including carbon nanotubes, molybdenum and an inorganic support. Said catalyst is used to produce nanotubes.

Document D4 describes the use of carbon nanotubes as a filler in polymeric matrices. D4 does not describe catalysts including carbon nanotubes.

These improvements were not foreseeable in the light of the cited documents and therefore an inventive step is recognised.